

Time budgets and time use

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Time Budgets and Time Use

Teresa Harms and Jonathan Gershuny

A brief history and background

Some of the earliest time use surveys (TUS) were conducted in Russia by Strumilin in 1924 and the United States (Sorokin & Berger, 1939). The Vienna Centre and UNESCO sponsored the first purpose-designed multinational comparative time budget data collection, which was carried out in the mid 1960s (Szalai, 1972). This large-scale study – involving the 12 countries of Belgium, Bulgaria, Czechoslovakia, Hungary, Peru, Poland, Germany, France, the United Kingdom, USA, the USSR, and Yugoslavia – concentrated exclusively on single metropolitan areas (Andorka, 1987; Gershuny, 1995). The methodologies developed for the Szalai study, both the coding conventions and instrument design, formed a point of reference for most of the subsequent time use surveys.

As a result it was relatively easy to harmonise many of the national-scale time use studies that emerged in the two decades following the Szalai study into a consistent set of time use and other ancillary coding categories, so as to create a cross-national historical comparative dataset on a post-hoc basis. The Multinational Time Use Study (MTUS) started this work in the late 1980s (for the latest version visit www.timeuse.org) and the initial success of this work encouraged Eurostat to set in motion the design activity that culminated in the Harmonised European Time Use Study (HETUS).

The first HETUS round (1998-2002) had just under 20 national participants (including the UK, France, Germany, Italy, Spain, Portugal, Netherlands, Denmark, Sweden, Finland and others: non-participants included Ireland, Greece and Luxembourg). Most recently, the US Bureau of Labour Statistics decided to run a continuous annual time use study, as the 9th wave of the Current Population Survey (an eight-wave national panel somewhat analogous to the European Labour Force Survey). Although the design was established independently of the HETUS process, comparison at some level is possible via the latest version of the MTUS.

Time use surveys collect detailed activity sequences throughout specified periods usually ranging from one day to one week. Special purpose surveys focus on specific population groups or activities (e.g. media use), while general-purpose surveys collect time use data that are representative of the main groups within the society. The core of a Time Use Study (TUS) is a *time use diary*, which registers continuously an individual's sequence of activities over a specified period. The diary is designed to enable the respondent to record various aspects of each activity in separate *fields*. In the international standard Harmonised European Time Use Study (HETUS) instrument, the fields are *main activity*, *other simultaneous activities*, *location* and *others present*.

Time use studies are sometimes loosely referred to as *time budget studies* (this term is more properly applied to calculations of simple activity totals from the diary's main activity field, analogous to the money budgets calculated from expenditure diaries). But increasingly important applications of time diaries involve the analysis of *activity sequences*, revealing phenomena such as the times of day that activities are undertaken, the consequentiality of successions of activity (e.g. shopping requiring travel which may be interrupted by childcare responsibilities) or co-presence (parents caring for children, couples taking leisure together).

Successful analysis of diary surveys is dependent on the collection of appropriate ancillary materials, in the form of a *questionnaire* containing specific descriptive information (such as frequency of participation in infrequent leisure activities, expressions of values and practices related to gender division of labour in addition to conventional socio-demographic *face-sheet* variables). So, for example, the HETUS also has a seven-day *work-schedule instrument*, providing more specific information about work timings through the day, and weekly variation in work times, than that available from questionnaire sources such as the Labour Force Survey.

Applications of time use study data

Time use budgets have diverse applications. Andorka (1987), in an important review article, examined the purposes and uses of time use studies – ranging from practical applications to the examination of complex theoretical problems – and identified many different potential 'fields of utilisation'. One set of purposes related to consumption, including establishing the

extent of mass media contact, identifying the demand for cultural and other leisure goods and services, and studying consumer behaviour. Another important research area was ascertaining the sexual division of labour in the household and assessing the informal economy and household economics, including the needs of the elderly and the care of children. Other purposes for time budget data included conducting social accounting, exploring issues related to the 'style of life', establishing social indicators, assessing wellbeing and the 'quality of life' and urban planning. At the macro scale of analysis, sociologists use time budget data for examining aspects of social structure and for conducting inter-temporal and international comparisons.

Time use datasets enable sociologists to produce inter-temporal comparisons and calculate changes in the allocation of time across different populations. Sequences of time use surveys from a given society provide a good foundation from which sociologists can ascertain important social changes (Andorka, 1987; Szalai, 1972). Until recently, technological difficulties with data management and analysis have resulted in a relatively limited range of practical applications, which in turn has reduced demands for the development of new methods for data handling and analysis. Nevertheless, current time use data provide information on how a given activity (in time) is placed in relation to other leisure and non-leisure activities data, the geographical location of activities, the time at which they occurred, and the sequence of temporal-spatial locations (Gershuny, 2000).

Carlstein and Thrift (1978) argue that the main disparity between *time use* studies and other descriptions of human activities is the degree of specificity and quantitative precision. It *does* matter whether individuals undertake certain activities for one hour or six hours per day, or one day or seven days each week. Further, these quantitative differences can be large enough to attain qualitative significance. Regardless of the setting or of the particular activity under examination, attaining a precise account of time and other resources requires numerical specification of the relative duration, frequency and temporal location of activities.

TUS datasets have an unusually broad range of possible applications.

Capturing technological change and economic growth: Economic policy is largely concerned with the pace of economic growth. Growth depends critically on investment, yet conventional

measures ignore the substantial investments of time that add to the stock of human capital. Time use studies provide information on when people shop, when they commute to work, how much time they spend reading newspapers and books and watching television and using the internet, and many other aspects of behaviour that contribute both to their accumulation of economically salient work skills, and to the cultural and social capitals that determine their consumption patterns.

Identifying relationships between conventional measures of national product and otherwise unmeasured production: What happens when people switch their activities from the household (painting one's living room or doing one's own gardening) to the market sector (hiring a painter or a gardener) or vice versa? Standard statistical measures may give a misleading impression of well-being and the pace of economic activity, leading in turn to inappropriate economic policy decisions. For example, self-provisioning outside the money nexus is captured systematically (as *unpaid work*) by time diary studies and but is otherwise virtually invisible to conventional economic statistics.

Measuring the impact of labour market exclusion: How much time is spent searching for work? Are those self-described as unemployed in fact working (for money or not) within or outside their own households? Previous UK time use studies suggest that a third of all working age non-employed engage in some paid work in any given week. Does this continue to be the case? Do those who lose their jobs spend more time on cleaning, cooking and other productive household activities or do they slide into inactivity?

Capturing domestic divisions of labour: Sociological studies indicate that women continue to maintain their role of domestic provider despite progressive re-entry into the labour market in the second half of the 20th century. Time use data are the only source that could establish that there has been a substantial convergence in men's and women's domestic work time totals and that the gender gap is still sufficiently large to give women a substantial disadvantage in competition for jobs and promotions. Is the gender convergence observed from the 1960s to 2001 continuing over the present decade? Only the 2008-2012 round of HETUS data collection could possibly answer this question.

Documenting sociability, co-presence and care activities: Time use data, stored in the form of activity sequences with activity and co-presence fields, registers time spent in activities with others. Activity sequences recorded in diaries, with separate fields representing multiple simultaneous activities and registering who is present during them, provide unique, specific and reliable evidence of the nature of relationships between spouses and the distribution of personal care activities devoted to both children and elders

Capturing personal activity levels in relation to health objectives: Diaries provide unprompted evidence of the incidence and duration of episodes of formal exercise (sports participation, going to the gym) which are rather lower than those that emerge from dedicated exercise surveys. The discrepancy between diary and questionnaire estimates may relate to social desirability effects in responses to question investigating sports activity. Time use data also reveal the extent of informal exercise (e.g. walking to the shops, dancing) that takes place in the course of daily life, but is frequently missing from more focussed surveys.

Measuring individual exposure to environmental risk, and the collective environmental strain imposed by daily activity: The continuous and sequential observations in time use diaries provide the only comprehensive source of information on these; there is no alternative data source. Time diary studies are used in the US for purposes such as estimating exposure to sunlight and environmental toxins by the Environmental Protection Agency, and for predicting fuel demand deriving from private individuals' and households' travel, space heating, cooking and leisure activities.

A few of these applications – the extended GNP calculations, and the measures of the domestic division of labour for example – are well developed and quite widely used in Europe. But despite the long history of time use data collection, and perhaps because of the complex data processing requirements of diary datasets (now much better understood and more manageable in modern statistical packages (e.g. SAS, SPSS and STATA) most of the potential applications exist mainly in the minds of university researchers, statisticians in statistical bureaux and specialist journals. Their major policy impact is yet to come.

Diary design considerations

The time use study designer needs to make decisions about whether to ask the respondents to make a *continuous recording* of their activities or slot them into *fixed time-points* or *intervals*. Continuous recording allows respondents to determine freely the time when one activity ends and another begins, whereas fixed points require the respondent to record what activity was occurring at specific time-points or intervals throughout the day. Most diary instruments specify intervals of 5, 10, 15, or 30 minutes, although some leave respondents free to specify their own start and finish times to the nearest minute. Very short time intervals can contribute to respondent burden and are time consuming to code. Intervals that are too long, however, can encourage respondents to concatenate or omit certain short duration activities.

Diaries can be either pre-coded or open-ended. Both forms have their own strengths and weaknesses. *Pre-coded* or *light diaries* usually contain a list of activities or codes printed on the diary form from which the respondent selects and marks the appropriate codes. One inherent weaknesses associated with this format is that the researcher can realistically include only a limited number of activity categories (usually no more than 35) into even the most streamlined diary (Gershuny, 1995; Ås, 1978). Nevertheless, pre-coded diaries are ideal for special purpose surveys because they allow the researcher to identify and capture specific types of activity such as childcare, household work or leisure. Pre-coded diaries impose less respondent burden than do open-ended diaries because they are relatively simple and quick to complete and therefore allow the researcher to survey more diary days – up to week in some cases.

Open-ended or *heavy diaries* use the respondent's own language and carry their own set of strengths and weaknesses. Given respondents' differing skills and motivations, open-ended diaries allow diarists greater freedom to record those activities they deem important, some of which may be unusual or unpredictable. These unexpected activities may increase the researcher's awareness and understanding of the population under investigation and lead to more focussed follow up studies.

Primary activity (main activity) data are by far the most analysed element in the time use diary, although other dimensions of time are also included, such as where and with whom (if applicable) the activity took place, and the mode of transport used while travelling. Rather

less commonly, researchers ask diarists to evaluate their activity in some way. This includes how enjoyable the activity was, whether the respondent would have liked to devote more time to the activity, whether the respondent considered the activity as work, duty or leisure, and so on. However, most time use diary formats allow the respondent to record at least two activities as occurring *simultaneously* within the same time period, although some ask diarists to record only a single activity in each time slot. Respondents trying to slot their daily activities into a standardised time diary format may find it difficult to determine which of the two simultaneous activities they should record as the primary or main activity. This can also be a problem during the coding process.

The most commonly used types of time use field instruments are *tomorrow* and *yesterday* diaries, which are both suitable for self-completion or interview. One of the advantages that diaries have over conventional questionnaires is that they provide reliable information about respondents that respondents do not necessarily have about themselves (because respondents in general do not calculate the aggregate amount of time they devote to various activities, or if they do, their estimates are likely to be inaccurate). Interviewers, after initial contact with the respondent, leave *tomorrow diaries* behind for the respondent to complete on the following day or set of days. Unless they are pre-coded, tomorrow diaries demand a reasonable level of self-expression and discipline. *Yesterday diaries* require the respondent to recall and reconstruct recent events and are generally more standardised and somewhat easier to administer, control and edit (clean) than tomorrow diaries. With this option, an interviewer asks a respondent about the activities in which she or he engaged on the previous day.

Activities vary across days, through with some degree of cyclicity within single weeks. Many activities (such as clothes washing) are undertaken regularly but not daily, so diaries with shorter (e.g. one day) observation or recording periods will show zero-totals for many activities; the longer the recording period the fewer of these zero-totals, and the lower the standard errors of the estimates of mean times in the activities. Seven-day diary studies (as collected in the Netherlands and the UK) have substantial benefits, are convenient to analyse, and provide low standard errors. However, they impose compensating costs. Longer diaries are always collected on a 'yesterday' recall basis, diarists being asked to fill in their diaries at least once per day. The marginal costs of collecting the longer diaries are low (particularly if the diaries are returned by post at the end of the collection period). But the completion of a

longer *yesterday* diary is a burdensome task for the respondent, and response rates are somewhat lower than those from shorter diaries.

Other time use measurement techniques

Some researchers view the *experience sampling method* (ESM) as a technical improvement to the diary method because it is less dependent on the respondent carefully completing a diary over the course of a day (e.g. Verma et al., 1995). Researchers typically ask respondents to carry, over the course of a week, an electronic watch or small beeper to signal times (randomly assigned by the researcher) when respondents must record the activity in which they are engaging at the time. The random time selection allows the analyst to estimate the respondent's time use over the collection period and enables accurate measures of fleeting activities (Csikszentmihalyi & Larson, 1987; Larson & Kleiber, 1993; Larson & Verma, 1999).

Recall self-reporting includes research methods where respondents report retrospectively on their time use. The two main characteristics of this category are data collected through respondent self-reports and respondents recalling their activity from earlier periods and reporting it. An alternative is to ask the respondent how much time he or she spent the previous day or week or how much time he or she usually spends each day or week engaging in particular activities: these probes allow the analyst to construct *stylised estimates* (Juster, Ono & Stafford, 2003; Robinson, 1985).

The *activity checklist* can, in principle, capture information on an extensive range of activities. A typical checklist might ask the respondent the following questions: "Over the last X days/weeks/months, have you participated in activity Y? If 'yes', how many times?" This permits the frequency of participation in specific activities to be calculated, but not their duration. However, it does allow the researcher to gather activity data over relatively long periods, which makes it possible to capture information on infrequent or seasonal activities (Ås, 1978; Bonke, 2005; Kitterød & Lyngstad, 2005).

Collecting time use data using *computer-aided telephone interviewing* (CATI) has been trialled in several countries, including the Netherlands and the United States. Results from

these studies show that the amount of data collected from any one respondent is limited and that existing samples are restricted to primary activities over the course of a single day.

New approaches

Not yet established, but firmly on the research agenda, are new high-tech approaches combining passive measurement of geographical position and movement (using GPS and accelerometer data) and bodily states (using tiny monitors for heart rate, blood lipids, etc.). These approaches include active questioning about the nature and purpose of the activity employing several recording options: via personal communication or recording devices carried by the respondent/subject; nearly concurrent with the activities (What were you doing when the beeper sounded?); or perhaps later the same day via the internet.

For the moment, however, it seems appropriate to consider the HETUS design as the gold standard, necessary for both cross-national and long-run historical comparisons. Substantial population-level changes in time use patterns are in general impossible to identify on an annual basis, hard to descry on a five yearly, but often clearly apparent on a 10-yearly basis. There may be a case for more frequent three to five-year light-diary studies to track short-term shifts (e.g. the diffusion of internet technology use, effects of changes in shopping regulations), but the 10-year recapitulation of HETUS-type studies seems to be the sensible choice.

Current developments and data requirements

A new HETUS round is planned by Eurostat in 2008-2012. This will enable both historical comparisons with previous national level studies and also cross national comparisons. Provision of a national contribution to this exercise should be a key objective for the social scientific research community of each EU member-state.

Beyond HETUS participation, perhaps the key advance now needed is the development of longitudinal or panel-type time-us studies. There is a reciprocal relationship between the short-run of activities throughout the day and the long-run of the life-course. Personal resources and capabilities accumulated through the life-course give rise to individual

characteristics (e.g. class and status) and as a consequence access to specific daily activities. Conversely, the particular daily activities (both work and leisure) accumulate over the long term to form just those same individual characteristics (i.e. human, cultural and social capital).

So there are clear academic benefits to collecting diary data on a longitudinal basis. But the short observation-period (two days) makes the HETUS design an inappropriate basis for this, since annual differences would overwhelmingly reflect short term (weekly) *individual-level intrapersonal variability* rather than *longer-term change*. The UK has experimented with collecting a seven-day light diary for a small three-year panel with a design based on the British Household Panel Study and the German Socio-economic Panel (the BT funded Home-on-Line study). This is however a very expensive option. An alternative approach is a *time-use data-linkage exercise* with existing panel studies along the lines set out in Kan & Gershuny, (2007). This approach depends critically on having substantial questionnaire-type evidence of time use patterns in the target panel survey. Identical questions are then collected as ancillary data to a time diary sample, time-budget activity totals are regressed onto the ancillary data in the diary studies, and finally the resulting regression coefficients are applied to the panel study to produce estimated time-budget totals for the respondents in the panel study.

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